W. M. Dunkle

# DENSITY OF SEA WATER

COAST AND GEODETIC SURVEY TIDE STATIONS

PACIFIC OCEAN

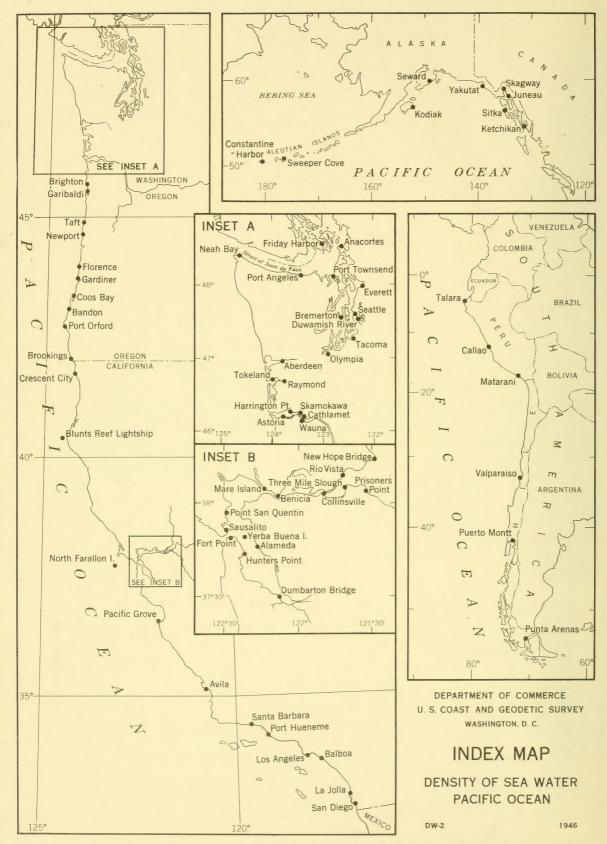
DW-2 REVISED 1946

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
WASHINGTON



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Density - salinity conversion table Inside back c	over



# LIST OF STATIONS

Station	Lat.	Long.	Page
CALIFORNIA	0 1	0 1	
CALIFORNIA	North	West	
San Diego	32 43	117 10	6
La Jolla	,	117 15	6
Balboa		117 54	27
Los Angeles Harbor		118 16	7
Port Hueneme	34 09	119 12	27
Santa Barbara	34 25	119 41	8
Avila	35 10	120 44	8
Pacific Grove		121 55	27
North Farallon Island	37 46	123 06	27
San Francisco Bay and Tributaries	07 40	100.07	0
San Francisco (Fort Point)San Francisco (Hunters Point)		122 27 122 22	8
Dumbarton Bridge		122 22	9
Alameda (Naval Air Station)		122 18	9
Yerba Buena Island		122 22	10
Sausalito		122 29	10
Point San Quentin		122 29	10
Mare Island (Navy Yard)Benicia, Carquinez Strait		122 16 122 08	10 10
Three Mile Slough, San Joaquin River		121 41	10
Thi ce mile blough, but bought River	00 00	121 11	10
Prisoners Point, San Joaquin River	38 04	121 33	11
Collinsville, Sacramento River		121 51	11
Rio Vista, Sacramento River		121 42	11
New Hope Bridge, Mokelumne River		121 29	11
Blunts Reef LightshipCrescent City		124 30 124 12	27 12
Crescent City	41 40	124 12	12
OREGON			
Brookings	49 03	124 17	12
Port Orford		124 17	12
Bandon, Coquille River		124 25	13
Coos Bay entrance	43 21	124 19	13
Gardiner, Umpqua River		124 07	13
Florence Studlew Pivon	49 50	194 06	13
Florence, Siuslaw River Newport, Yaquina Bay		124 06 124 03	13
faft, Siletz Bay		124 01	13
Garibaldi, Tillamook Bay		123 55	13
Brighton, Nehalem River		123 56	14
Columbia River			
Astoria (Tongue Point)		123 46	14
Wauna	46 10	123 24	15

### LIST OF STATIONS — Continued

Station	Lat.	Long.	Page
WASHINGTON	North	vest	
Columbia River			
Harrington Point	- 46 16	123 39	15
Skamokawa		123 27	15
Cathlamet	- 46 12	123 23	15
Tokeland, Willapa Bay	- 46 42	123 58	16
Raymond, Willapa River		123 45	16
Aberdeen, Grays Harbor	- 46 58	123 51	17
Puget Sound and Approaches	40.00	404 08	4.00
Neah Bay		124 37	17
Port Townsend (Fort Worden)		123 26 122 46	17
Everett		122 13	18
Bremerton		122 38	18
			20
Seattle (Elliott Bay)		122 20	18
Seattle (Duwamish River)		122 19	19
Tacoma		122 25	19
OlympiaAnacortes		122 54	19
Friday Harbor, San Juan Island		122 37 123 00	20
Friday harbor, San Suan Island	- 40 00	120 00	20
ALASKA			
Ketchikan	- 55 21	131 39	21
Sitka		135 20	22
Juneau	- 58 18	134 25	22
Skagway		135 19	23
Yakutat	- 59 33	139 44	24
Seward	- 60 06 *	149 27	23
Kodiak		152 24	24
Sweeper Cove, Adak Island		176 39	24
Constantine Harbor, Amchitka Island	- 51 25	180 42	24
HAWAIIAN ISLANDS			
HAWATTAN TSLANDS			
Honolulu		157 52	25
Sand Island, Midway Islands	- 28 12	177 22	25
SOUTH AMERICA	South	West	
Punta Arenas, Magellan Strait, Chile	- 53 09	70 54	25
Puerto Montt, Chile		72 58	25
Valparaiso, Chile		71 38	25
Matarani, Peru	- 17 00	72 07	26
Callao, Peru		77 09	26
Talara, Peru		81 17	26

#### INTRODUCTION

The monthly mean and yearly mean and extreme densities of sea water given on the following pages are based on hydrometer readings which usually were made once each day from water samples drawn from near the surface. These observations were made at tide stations maintained by the U. S. Coast and Geodetic Survey along the Pacific Coast of the United States, Alaska, and the Hawaiian Islands, and at stations maintained cooperatively in Chile and Peru. A supplemental table is included which shows average monthly surface salinities at places along the California coast as furnished by the Scripps Institution of Oceanography.

The UNIT OF DENSITY is the density of fresh water at a temperature of 4°C (39.2°F). The actual density of the water may vary from a little less than unity for fresh water at a temperature other than 4°C to approximately 1.0310 for the heaviest sea water. Since the density of sea water, as observed, depends not only upon the amount of soluble matter contained in a unit volume, but also upon the temperature of the water at the time the reading was made, it is necessary to reduce the observed densities to some standard temperature in order that they may be comparable and indicate the amount of matter held in solution. IN THIS PUBLICATION THE OBSERVED DENSITIES HAVE BEEN REDUCED TO A STANDARD TEMPERATURE OF 15°C (59°F). The density of pure water at a temperature of 15°C is taken as 0.9991.

The SALINITY of sea water is defined as the number of grams of salts contained in 1000 grams of sea water. While the total amount of salts contained in a given volume of sea water varies in different places, the relative portions of the different kinds of salt are nearly constant in all parts of the ocean. The salinity of sea water may be determined by several different methods, one of the simplest being based upon the density of the water as obtained from use of the hydrometer. The table on the inside back cover gives the salinity corresponding to different values of density at the standard temperature of 15°C to which all densities in this publication are referred.

In the following table the mean and extreme densities for each series are given on the line labeled "Mean density" whenever the series covers two years or more. On the next line the corresponding salinities are given. Other density values in the table can be converted to salinity, if desired, by means of the table in the back of the book. The seasonal variation in salinity is shown graphically for Coast and Geodetic Survey stations where the observations cover five years or more.

Other publications in this series, which are available from the U. S. Coast and Geodetic Survey, are as follows:

- TW-1. Surface Water Temperatures, Atlantic and Gulf Coasts.
- TW-2. Surface Water Temperatures, Pacific Coast.
- DW-1. Density of Sea Water, Atlantic and Gulf Coasts.

Density of Sea Water

								-													_			
emes Min.		1.0228	240	1.0228	30.8			1.0240	243	224	247	248	248	249	240	245	246	241	244	237	234	243	242	
Extremes Max. Mi		1,0258	258	1,0261	35.1			1.0256	251	250	251	252	252	252	250	251	250	250	251	251	251	252	251	
Means		1.0246	250	1.0249	33.6				249	248	249	250	250	251	249	249	249	248	249	249	249	250	249	
Dec.		1.0246	246	1.0247	33.3			1.0248	248	248	248	250	251	250	248	249	248	249	248	249	248	250	247	
Nov.		1.0248	247	1.0249	33.6			0		0		250	250	250	249	250	248	248	249	250	249	250	248	
Oct.		250	246	1.0248	33.4			•0246	249	249	249	249	250	250	248	250	248	248	248	250	249	250	248	
Sept.	IF.	253	249	1.0251	33.8	LL.		0	248	250	249	249	250	250	249	250	249	248	250	250	249	249	249	
Aug.	SAN DIEGO, CALIF.	1.0252 1 256	251	1,0252	34.0	JOLLA, CALIF.		1.0252 1	249	250	250	250	250	251	249	250	249	249	250	250	250	251	250	
July	N DIEG	1.0251	254	1,0253	34.1				062	249	250	251	250	252	250	250	250	249	250	250	250	251	249	
June	SA	1,0249	253	1.0251	33.8	LA			250	249	249	250	250	251	250	251	250	249	250	250	250	251	250	
May		251	253	1,0250	33.7				642	248	249	250	249	250	250	250	250	249	249	249	250	250	250	
Apr.		1.0244 ]	251	1.0248	33.4				7.47	248	249	249	249	251	249	249	249	248	249	247	249	249	249	
Mar.		1,0241 ] 248	251	1.0247	33.3			0249	4 .	d'	4	249	4	251	247	248	248	248	248	245	246	249	249	
Feb.		1.0240 ]	4 4	1.0246 ]	33.2			4 4	d .	4	4	249	4	250	246	248	248	247	247	246	249	248	249	
Jan.		1.0240 ]	248	1,0246	33.2		1	0 0	249	248	248	249	249	251	249	248	249	248	248	248	250	248	250	
Year			1925	Mean Density 1	Salinity		1	0 0	1926	35	92	1929	93	1931	1932	1933	1934	93	93	1937	1938	1939	94	

1942   247   247   246   248   249																																	
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	239	242	# 2	244	9	1.0224	30.3			1.0244	242	208	191	241	247	241	240	228	239	201	242	242	223	185	242	213	168	237	188	171	238	1.0168	23.0
247   247   247   248   248   249	250	250	000	257			34.5			1.0		250	258	254	256	255	257	255	256	253	254	255	257	256	257	259	253	259	259	255	256	1.0259	
247   247   248   248   249	247	242	040	240	2	1.0249	33.6				245	245	247	249	251	251	251		250	248	248	249	248	248	251	249	1	251	249	248	250	0	33.4
247   247   244   248   249	247	240	040	248		1.0249	33.6			1.0247	244	245	248	249	250	252	24.8	248	250	245	248	248	250	244	252	245	247	249	248	247	246	1.0248	33.4
247         244         245         246         246         246         249 <td>247</td> <td>040</td> <td>040</td> <td>243</td> <td></td> <td>1.0249</td> <td>33.6</td> <td></td> <td></td> <td>1.0246</td> <td>243</td> <td>245</td> <td>247</td> <td>249</td> <td>251</td> <td>251</td> <td>250</td> <td>8 8</td> <td>251</td> <td>247</td> <td>248</td> <td>250</td> <td>251</td> <td>249</td> <td>251</td> <td>248</td> <td>248</td> <td>253</td> <td>251</td> <td>249</td> <td>249</td> <td>1.0249</td> <td>33.6</td>	247	040	040	243		1.0249	33.6			1.0246	243	245	247	249	251	251	250	8 8	251	247	248	250	251	249	251	248	248	253	251	249	249	1.0249	33.6
247         244         245         246         246         246         249 <td>247</td> <td>240</td> <td>0 40</td> <td>249</td> <td></td> <td>1 . 0249</td> <td>33.6</td> <td>Ē</td> <td></td> <td>1.0247</td> <td>243</td> <td>245</td> <td>250</td> <td>248</td> <td>251</td> <td>251</td> <td>251</td> <td>248</td> <td>250</td> <td>248</td> <td>248</td> <td>249</td> <td>249</td> <td>249</td> <td>251</td> <td>250</td> <td>249</td> <td>251</td> <td>251</td> <td>251</td> <td>250</td> <td>1,0249</td> <td>0</td>	247	240	0 40	249		1 . 0249	33.6	Ē		1.0247	243	245	250	248	251	251	251	248	250	248	248	249	249	249	251	250	249	251	251	251	250	1,0249	0
247 247 247 248 248 249 249 249 249 249 249 249 249 249 248 249 249 250 250 250 250 250 250 250 250 250 250	248	240	040	250			33.6			1.0249	244	246	249	248	251	252	250	249	250	249	248	249	251	250	252	250	250	251	251	251	250	1.0250	33.7
247         247         244         248         249 <td>248</td> <td>250</td> <td>2000</td> <td>250</td> <td></td> <td>1.0250</td> <td>33.7</td> <td>HABBC</td> <td>Dana</td> <td></td> <td>245</td> <td>247</td> <td>250</td> <td>250</td> <td>252</td> <td>252</td> <td>252</td> <td>249</td> <td>251</td> <td>248</td> <td>250</td> <td>251</td> <td>250</td> <td>252</td> <td>252</td> <td>251</td> <td>250</td> <td>253</td> <td>252</td> <td>251</td> <td>251</td> <td></td> <td>53.7</td>	248	250	2000	250		1.0250	33.7	HABBC	Dana		245	247	250	250	252	252	252	249	251	248	250	251	250	252	252	251	250	253	252	251	251		53.7
247         247         244         243         249 <td>249</td> <td>040</td> <td>250</td> <td>250</td> <td></td> <td></td> <td>33.7</td> <td>OH IHU</td> <td>GELES</td> <td>1.0248</td> <td>245</td> <td>246</td> <td>248</td> <td>249</td> <td>252</td> <td>252</td> <td>252</td> <td>250</td> <td>251</td> <td>250</td> <td>249</td> <td>251</td> <td>251</td> <td>252</td> <td>252</td> <td>251</td> <td>249</td> <td>253</td> <td>253</td> <td>252</td> <td>252</td> <td></td> <td>33°7</td>	249	040	250	250			33.7	OH IHU	GELES	1.0248	245	246	248	249	252	252	252	250	251	250	249	251	251	252	252	251	249	253	253	252	252		33°7
247         247         244         243         249 <td>248</td> <td>250</td> <td>250</td> <td>250</td> <td>0.00</td> <td>1.0250</td> <td>33.7</td> <td>OS AN</td> <td>200</td> <td></td> <td>246</td> <td>245</td> <td>251</td> <td>250</td> <td>252</td> <td>251</td> <td>252</td> <td>250</td> <td>251</td> <td>249</td> <td>249</td> <td>251</td> <td>249</td> <td>252</td> <td>252</td> <td>250</td> <td>247</td> <td>252</td> <td>252</td> <td>250</td> <td>252</td> <td>1.0250</td> <td>53.7</td>	248	250	250	250	0.00	1.0250	33.7	OS AN	200		246	245	251	250	252	251	252	250	251	249	249	251	249	252	252	250	247	252	252	250	252	1.0250	53.7
247     247     244     243       248     247     246     248       249     248     249     249       249     248     249     249       1.0249     1.0248     1.0248     1.0248       1.0248     1.0248     1.0248     1.0248       245     245     246     246       247     247     246     246       248     249     250       249     249     251       249     249     251       249     249     251       249     249     251       240     249     249       247     249     249       247     249     249       247     249     249       247     249     249       247     249     249       248     246     248       249     249     249       240     246     248       241     246     248       242     249     249       243     247     248       244     246     248       249     249     248       249     249     248       240     248 </td <td>246</td> <td>250</td> <td>249</td> <td>250</td> <td></td> <td></td> <td>33.6</td> <td></td> <td>1</td> <td></td> <td>1.52</td> <td>244</td> <td>250</td> <td>250</td> <td>251</td> <td>251</td> <td>252</td> <td>251</td> <td>250</td> <td>249</td> <td>248</td> <td>250</td> <td>250</td> <td>251</td> <td>251</td> <td>250</td> <td>245</td> <td>253</td> <td>252</td> <td>250</td> <td>252</td> <td></td> <td>53.7</td>	246	250	249	250			33.6		1		1.52	244	250	250	251	251	252	251	250	249	248	250	250	251	251	250	245	253	252	250	252		53.7
247 247 244 248 247 246 248 247 246 249 248 248 1.0249 1.0248 1.0248 1.0248 1.0248 1.0248 247 245 246 247 244 246 243 249 247 249 249 247 249 249 247 249 249 247 249 249 247 249 249 247 249 249 247 249 249 247 249 249 247 249 249 247 249 249 247 249 249 247 244 249 247 246 249 247 246 249 247 246 246 247 248 249 248 249 249 249 240 244 239 240 240 246 246	243	248	248	249	0.00	0 4 7 0 °	50			0247	246	240	247	251	250	251	252	251	249	249	247	249	248	248	251	250	1	250	251	249	251	.0248	60
247 247 247 248 249 248 249 248 247 245 249 248 249 248 249 249 249 245 247 245 245 247 245 247 245 247 246 247 248 244 248 247 248 248 244 248 244 248 248 244 248 248	244	246	246	248			33°4				246	244	244	248	249	249	253	249	249	248	246	247	246	238	249	250	231	250	246	242	247		0
1.02448 2448 33.6 2457 1.0248 1.02448 2457 2457 2458 2457 2458 2458 2458 2458 2458 2458 2458 2458	247	247	247	248			53.4				1.42	243	233	248	249	249	250	244	247	247	246	247	241	246	248	247	237	248	244	240	248		33.0
	247	248	248	249			33.6			0248	1.52	245	246	248	250	247	252	247	247	243	245	248	246	249	247	249	244	247	240	247	247		33.3
	1941	1943	1944	1945			Salinity				C26T	1926	1927	1928	1929	1.930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945		Salinity

Density of Sea Water - Continued

mes		1.0221	1	1		1		1.0124 158 210 149	132 110 125 194	214 148 180 178 127
Extremes Min		1.0260 1	-			1		1,0236 1 240 251 251	246 244 244 246	245 245 245 246 246 246
Means		1.0253	1.0252	34.0	11-2-	1		1,0206 218 237 215	220 208 222 222	225 219 2229 2229 212
Dec.		1.0252	1,0251	33.8		1,0251		1.0214 231 230 228	213 225 228 231	23. 23. 23. 23. 23. 23. 23. 23.
Nov.		1.0252	1.0252	34.0		1,0253		1.0227 232 241 229	2222 2223 242 240 240	251 251 240 240 240 233
Oct.		1.0251	1.0252	34.0		1,0253	ALIF.	1.0231 234 249 286	22 22 24 22 25 24 22 25 25 25	24 22 23 24 24 24 24 24 24 24 24 24 24 24 24 24
Sept.	CALIF.	1.0252	1.0253	34.1		1.0258 1.0256 1.0253	(Fort Point), CALIF.	1.0231 238 249 237	242 238 241 241	250 237 242 251 251
Aug.	SANTA BARBARA, CALIF	1.0254	1.0254	34.2	AVILA, CALIF	1.0258		1,0224 232 247 234	243 240 240 241	24 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
July	TA BAR	1.0254	.0254 1.0254	34.2	AVILA	1,0256	FRANCISCO	1.0207 219 245 226	232 232 233 236	237 216 216 232 241 217
June	SAN	1.0254 254 255	1.0254	34.2		1.0257		1.0170 204 238 200	223 222 222 224	227 241 203 218 235 185
May		1.0253 253 254	1.0253	34.1		!	SAN	1.0173 201 232 187	203	213 203 202 218 227 174
Apr.		1,0253 254 252	1.0253	34.1		1		1.0189 198 229 186	183 179 180 222	201 229 210 210 217
Mar.		1,0251 255 255	1.0252	34.0		1		1.0180 210 223 196	200 168 206 218	191 224 210 220 212 201 201
Feb.		1.0253	1.0250	33.7		1 1		1.0204 204 225 195	196 178 208 217	222 222 222 222 211
Jan.		1.0251	1.0250	33.7		1		1.0218 208 231 225	228 219 220 224	215 229 209 231 231 213
Year	-	1930 1931 1932	Mean Density	Salinity		1945		1922 1923 1924 1925	1926 1927 1928 1929	1930 1931 1932 1934 1934

							9
114 098 050 200 043	051 094 096 169	1,0043	1,0119	4 1 1	1,0012	074 071 086 116	1.0012
242 243 243 243 255	238 238 250 252 252	1.0257	1.0240 1.0119	0 8 8	1.0232	229 220 231 238 228	1,0258
213 208 191 233 204	189 213 231 223	1.0218	8	i	1.0177	161 167 176 203 190	1.0184
232 198 224 236 236	213 234 228 210	1.0226	1.0185	3 8 0	1.0230	188 198 214 202 186	1.0204
234 230 228 242 242 231	218 235 234 828			CALIF.	1,0236	223 210 217 212 205	1.0217
236 236 231 244 240	23 8 2 2 3 2 4 2 2 4 2 4 2 4 2 4 2 4 2 4 2 4	1.0240 1.0234 32.4 31.6	CALIF. 1.0224 1.0212	) BAY, CALIF 1.0222	1,0242	219 216 226 232 217	1.0226
23 2 2 2 3 3 4 2 2 4 2 2 2 3 2 3 3 4 2 3 3 4 2 3 3 4 2 3 4 2 3 4 3 4	232 245 246 246 246	1.0241		NCISCO 1.0218 tion), CA	1,0246 226	212 214 219 232	1.0224
235 234 224 245 245	222 223 233 244 233 939	1.0237	FRANCISCO (Hunters Point), 1.0198 1.0210 1.0228	N FRA® 1.0204 Air Stat	1.0244	197 200 209 222 216	1,0215
222 203 203 242 226 326	214 223 233 235 231		1SCO (	1.0183 1.0183	1,0233	180 176 193 210 202	1.0199
200 196 167 234 209	187 174 215 223 218	1.0200 1.0209 1.0227 27.2 28.4 30.7	FRANCISCO (Hunters 1.0198 1.0210 1.0222		1,0220	151 152 168 196 187	1.0178
187 181 157 225 188	163 187 198 219 213	1.0200	SAN 1.0182 1	IBARTON BRIL 1.0144 1.0164 ALAMED,	1,0205 1,0220	126 140 146 187 170	1,0159
187 159 147 213 137	149 174 184 228 217	1,0192	1,0186	DUM	99	108 133 122 184 170	1,0144
170 173 131 222 134	126 189 172 214 209		1,0183	1.0146	1,0195 1,01	092 128 113 170 163	1,0137
197 201 150 223 182	143 138 166 222 205	1.0198 1.0192	1.0156 1.0183	1.0195	1.0146	103 093 121 181 154	1.0133
211 227 200 223 203	167 190 204 231 225	Mean 1.0215 :	1	1.0236	1.0174	128 148 164 206 194	1.0169
1936 1937 1938 1939 1940	1941 1942 1943 1944 1945	Mean Density Salinity	1945	1937	1939	1941 1942 1943 1944 1945	Mean Density Salinity

Density of Sea Water - Continued

Extremes Max. Min.		\$ 8 8 8 6	,	8 8 8		8 8		8 8		8 8		1,0068 0,9993
Means		1		1 1		:		1		\$ \$ \$		1.0007 1.0068
Dec.		1		\$ \$ \$		\$ \$ \$		8 8		8 8		0.9995
Nov.	CALIF.	# # #		8 8	CALIF.	1.0194		ł		10101	ALIF.	1.0002
Oct.	YERBA BUENA ISLAND, SAN FRANCISCO BAY, CALIF.	1,0235		0208 1,0161 1,0157 1,0194 1,0198 1,0200 1,0200	POINT SAN QUENTIN. SAN FRANCISCO BAY, CALIF.	0069 1,0084 1,0113 1,0167 1,0203 1,0201 1,0198 1,0194	LIF.	1.0147	ALIF.	0003 1,0005 1,0010 1,0025 1,0084 1,0125 1,0104 1,0101	THREE MILE SLOUGH, SAN JOAQUIN RIVER, CALIF.	0.9996
Sept.	ANCISC	1.0214 1.0227 1.0235 1.0235	LIF.	1.0200	NCISCO	1.0201	MARE ISLAND (Navy Yard), CALIF.	0012 1,0017 1,0029 1,0092 1,0140 1,0159 1,0147	BENICIA, CARQUINEZ STRAIT, CALIF.	1,0125	AUIN F	1.0037
Aug.	AN FR	1.0227	SAUSALITO, CALIF.	1.0198	IN FRA	1.0203	(Navy Ya	1.0140	NEZ ST	1,0084	AN JOA	1.0043
July	AND, S	1.0214	AUSAL	1.0194	ITIN. SA	1.0167	SLAND	1.0092	CARQUI	1,0025	UGH, S,	1.0012
June	NA ISL	1	S)	1.0157	N QUEN	1.0113	AARE 18	1.0029	NICIA.	1.0010	E SLO	1.0000
May	3A BUE	1 8		1,0161	NT SAN	1.0084	2	1.0017	BE	1,0005	REE MIL	0.9999
Apr.	YER	1.0139		1.	POI	-		1.0012		1,0003	THR	0.9999
Mar.		1.0143		1,0224		1.0078		1.0023		1,0001		0.9999
Feb.		1.0215 1.0187 1.0143		1.0224 1.0224 1.0224		1.0174 1.0102 1.0078		1,0108 1,0028 1,0023		1.0074 1.0012 1.0001 1.		0.9995
Jan.												0.9998
Year		1937		1937		1937		1937		1937		1938 1939 1940

PRISONERS POINT, SAN JOAQUIN RIVER, CALIF.  1935											11
PRISONERS POINT, SAN JOAQUIN RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COULINSVILLE, SACRAMENTO RIVER, CALIF.  CO			0.9991		1666.0	9	8 8		0.9991	!	
PRISONERS POINT, SAN JOAQUIN RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COULINSVILLE, SACRAMENTO RIVER, CALIF.  CO			1.0070		1.0049	2 E 2			1.0009	8 1 1	ļ
PRISONERS POINT. SAN JOAQUIN RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  PRIO VISTA, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLLINSVILLE, SACRAMENTO RIVER, CALIF.  COLUMN STA, SACRAMENTO RIVER, CALIF.  COLUMN S			1.0008		0.9998	0.9995	0.4		0.9996	0.9995	0.4
			0.9993			0.9991	0.0		0.9993		0.1
	ALIF.	0.9999	IF.			0.9992	0.0	LIF.	0.9994		0.1
	VER, CA	1.0005	R, CAL.	CALIF.		0.9995	0.4	/ER, CA	0.9994		0.3
	UIN RIV	1.0014	O RIVE	RIVER,	0.9995	1.0008	2.1	INE RIV	0.9992		0.4
	N JOAQ	1 1	AMENT	1ENTO	0.9994	1,0011	20.00	KELUM			0.9
	NT, SAN		., SACR 1.0005	ACRAN	0.9994	0.9997	0.7	GE, MC			0.8
	RS POIL	0.9994	SVILLE 0.9998	ISTA, S	0.9994 0.9991 0.9991	0.9992	0.0	'E BRIC			1.3
	RISONEI	0.9999	1,0001	RIO V	0.9995 0.9991 0.9992		0.0	W HOF			0.8
		0.9994	6666 0				0.1	N M			0.4
		0.9991	0.9997		0.9994 0.9991 0.9993		0.0				0.3
		0.9992	0.9995		0.9991 0.9991		0.0			0.9993	0.1
			6666 0				0.0				0.1
Salii 1.8 Salii	0000	1940	1937		1938 1939 1940	Mean Density	Salinity			Mean Density	Salinity

Density of Sea Water - Continued

emes Min.		10101	\$60 1910	113	160	103	960	117	305	260	101	169	147	1.0094	13.3		1 1		
Extremes Max. Min		2860	270	251	251	261	252	269	959	254	258	256	256	1.0283	38.0		1 1		
Means		2000	220	225	221	222	234	224	212	222	224	234	1	1.0224	30.3				11
Dec.		1.0221	224	238	211	228	226	229	194	184	239	224	202	1,0218	29.5		1.0221		1.0232
Nov.		1.0240	232	245	194	234	243	229	230	212	233	223	211	1.0226	30.6		1.0241		1.0245
Oct.		1.0240	222	246	240	243	240	239	240	242	246	245		1,0240	32.4		! !		1.0252
Sept.	SALIF.	1.0240	236	244	243	247	243	239	232	236	242	243	247	1.0241	32.5	2F		ORE.	1.0253
Aug.	CITY, CALIF	1.0244	236	233	243	244	243	242	227	240	236	242	243	1.0239	32.3	SU SUN		ORFORD, (	1,0258
July	CRESCENT	1.0232	239	231	235	239	243	238	215	233	238	244	240	1.0236	31.9	BROOKINGS ORF	1 1	PORT OR	1.0258
June	CRE	1.0222	234	224	208	221	241	245	214	220	229	235	244	1.0229	31.0	α.	1.0189	Po	1.0256
May		1.0204	223	219	231	230	238	225	201	217	236	232	211	1.0223	30.2		1.0097		
Apr.		0880	199	214	175	218	226	225	199	230	211	227	239	1.0216	29.3		1.0055		1.0245
Mar.		7190-1		218	215	175	201	193	203	232	199	235	227	1.0209	28.4		1,0221		1.0240
Feb.		0000		195	227	168	224	183	201	211	192	227	221	1.0206	28.0		1.0229		
Jan.		אס נט נ	198	189	226	212	237	203	189	210	189	231	219	1.0208	28.2		1,0215		1.0230 1.0238
Year		1933	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	Mean Density	Salinity		1933		1933

W 8		8 8 8		20 SE		8 8 8 8 8 8	8 6 9 9 0 0	8 g 8 0 8 0	9 8 6 9 6 6
8 8		4 6 3 0 8 8		4 #		# 1 # 1 # E	8 8 8 8 9 8	8 8 3 8 8 8	1 8 1
5 8 8 8 8 8		8 E E E E E E E E E E E E E E E E E E E		\$ 8 8 8 8 8		2 E 8 8 8 8 8 8	8 6 8 8 8 8	B 8 8 8	8 8 8 8 8 8
BANDON, COQUILLE RIVER, ORE.	COOS BAY ENTRANCE, ORE.	1,0163 1,0205 1,0201 1,0160 1,0235 1,0262 1,0262 1,0257 1,0175	GARDINER, UMPQUA RIVER, ORE.	0.9995 1.0016 1.0015 1.0009 1.0091 1.0134 1.0110 1.0117 1.0082 1.0004	FLORENCE, SIUSLAW RIVER, ORE.	1,0023 1,0092 1,0061 1,0019	NEWPORT, YAQUINA BAY, ORE.  1.0172 1.0213 1.0214 1.0226 1.0108	TAFT, SILETZ BAY, ORE.  1,00034 1,0151 1,0087 1,0143	GARIBALDI, TILLAMOOK BAY, ORE.  1,0080 1,0147 1,0131 1,0121 112
1933	# 2 3	1933	-	1933		1933	1933 1934	1933	1933

Density of Sea Water - Continued

Extremes lax. Min.				2 0.9991	52 0.9991 64 0.9991 72 0.9991 88 0.9991 95 0.9991	22 0.9991 52 0.9991 55 0.9991 57 0.9991 95 0.9991	37 0.9991 35 0.9991 30 0.9991 36 0.9991 36 0.9991
Ех1		2 2 2 8 0 8		1,0072	1.0062 1.0044 1.0072 1.0088	1.0102 1.0062 1.0085 1.0087	00000
Means		t 1 8 t 8 t		8666 0	1.0004 0.9996 0.9999 1.0005	1.0008 1.0102 0.9999 1.0062 0.9996 1.0035 1.0009 1.0095	1.0002   1.0095   1.0004   1.0059   1.0002   1.0080   1.0004   1.0096
Dec.		1.0043		1,0007	0.9996 0.9991 1.0022 1.0016	1.0022 1.0003 0.9991 0.9997 1.0051	1.0037 0.9996 1.0009 1.0001
Nov.		1.0155 1.0043		1,0018	1.0002 0.9993 1.0014 1.0027	1,0007 0,9995 0,9991 1,0006	1,0050 1,0003 1,0021 1,0036 1,0009
Oct.	ORE.	1.0171	Į, į	1,0008	1,0008 0,9996 1,0001 1,0018	1.0021 1.0011 0.9999 1.0012	1.0037 1.0028 1.0021 1.0021
Sept.	RIVER, (	1.0202 1.0200 1.0171	nt), ORE	6666*0	1,0006 0,9995 0,9999 1,0000	1.0009 1.0003 0.9996 1.0001	1.0013 1.0010 1.0003 1.0007
Aug.		1,0202	ASTORIA (Tongue Point), ORE.	0.9995	1.0005 0.9993 0.9993 1.0002	1.0005 1.0000 0.9995 0.9998	1.0005 0.9999 1.0000 0.9995 1.0001
July	N, NEH	1.0191	RIA (Ton	6666 0	0.99995 0.99995 0.9998 0.9998	0.9999 0.9999 0.9999 0.9999	0.9998 0.9999 0.9999 0.9991
June	BRIGHTON, NEHALEM	1.0089 1.0099	ASTO	0.9997	0.9999 0.9997 0.9996 0.9996	0.9995 0.9998 0.9995 0.9993	0.9997 0.9997 0.9991 0.9991
May	B			9666 0	0.9999 0.9995 0.9997 0.9994 0.9996	0.9996 0.9995 0.9994 0.9993	0.9997 0.9996 0.9996 0.9991
Apr.		1,0106 1,0117		0.9993	1.0005 0.9998 0.9994 0.9995 0.9998	0.9998 0.9993 0.9993 0.9991 0.9999	0.9998 0.9997 0.9995 0.9991
Mar.				1666.0	1.0000 0.9998 0.9996 0.9995 1.0004	1.0001 0.9993 0.9994 0.9992 0.9999	0.9996 0.9998 0.9998 0.9994
Feb.		1,0141		0.9991	1.0005 0.9997 0.9996 1.0017 0.9992	1.0020 1.0008 0.9996 0.9994 0.9999	1.0025 1.0008 1.0004 1.0000
Jan.		1.0041		0.9991	1.0021 1.0004 0.9996 1.0007	1,0026,0,9998,0,9994,0,9991	0,9993 1,0039 1,0000 1,0004
Year		1933		1925	1926 1927 1928 1929 1930	1931 1932 1933 1934 1935	1936 1937 1938 1939 1940

0.9991 0.9991 0.9991 0.9991	0.9991	0.0		0.9991		0.9991		0.9991		0.9991
1.0071 1.0050 1.0082 1.0099	1,0003 1,0102	14.4		0.9999		1.0001		6666 0		1.0000
1.0002 1.0071 0.9997 1.0050 1.0000 1.0082 1.0008 1.0099	1,0003	1.4		0.9992		0.9993		0.9991		0.9994
0.9994 0.9991 1.0008 1.0041	0.9995 0.9998 1.0005 1.0016 1.0014 1.0012	2.6		0.9991		0.9991		0.9991		0.9991
1.0005 0.9994 1.0014 1.0033	1.0014	o. N		0.9991	SH.	0.9991		0.9991		0.9991
1.0002 1.0014 1.0018 1.0028	1.0016	3.23	RE.	0.9992	ER, WA	0.9993	WASH.	0.9991	NASH.	0.9991
1.0000 1.0002 1.0010 1.0010	1,0005	1.7	WAUNA, COLUMBIA RIVER, ORE	0.9995	HARRINGTON POINT, COLUMBIA RIVER, WASH.	0.9994	SKAMOKAWA, COLUMBIA RIVER, WASH	0.9991	CATHLAMET, COLUMBIA RIVER, WASH	0.9991
1.0000 0.9997 0.9992 1.0000 0.9994	0.9998	8° 0	MBIA RI	0.9995	COLUMI	0.9995	UMBIA	0.9991	JMBIA F	0.9994
0.9996 0.9991 0.9994 0.9995 0.9995		0.4	COLUI	0.9992	OINT, 0	0.9995	A, COL	0.9992	T, COLL	0.9999
0.9991 0.9992 0.9994 0.9992 0.9991	0.9995	0.4	VAUNA	0.9994	STON F	0.9998	MOKAW	0.9991	HLAME	0.9996
0.9993 0.9991 0.9992 0.9992	0.9994	0.3	>	0.9992	ARRING	0.9994	SKA	0.9993	CAT	0.9995
0.9994 0.9991 0.9993 1.0001 0.9991	0.9995	0.4		0.9993	王	0.9995		0.9991		0.9996
1.0004 0.9994 0.9999 1.0000	0.9997	0.7		0.9991		0.9993		0.9991		0.9995
1.0022 1.0000 0.9993 1.0002 0.9997	1.0007 1.0003 0.9997 0.9995	1.4		0.9991		1666.0		0.9991 0.9991		0.9996
1.0017 1.0010 0.9992 1.0006		2.0		0.9991		0.9991		0.9991		0.9992
1941 1942 1943 1944 1945	Mean Density	Salinity		1940 1941 1942		1940 1941 1942		1940 1941 1942		1940 1941 1942

Density of Sea Water - Continued

mes Min.		1.0040	043 056 007 060	1.0007	2.0		1	1.0002
Extremes Max. Mi		1.0237	236 272 234 233	1.0272	36.6			1.0179 184 178 178 1.0184
Means		1,0185	175 178 180 184	1.0181	24.7		1	1.0080 089 079 085 1.0073
Dec.		1.0200 1.0190	167 157 178 190	1.0176	24.0		1,0093	064 049 055 055 053 1.0053
Nov.		1.0200	221 150 179 208	1.0192	26.1		1,0123	105 047 043 115 064 064 1.0080
Oct.	SH.	1,0213	218 201 210 210 216	1.0212	28.8	ASH.	1.0148	144 144 149 107 1005 100129
Sept.	TOKELAND, WILLAPA BAY, WASH	1,0216	213 212 213 213	1.0214	29.0	RAYMOND, WILLAPA RIVER, WASH.	1.0142	166 163 148 084 084 19.5
Aug.	LAPA B	1.0216	208 204 217 219	1.0213	28.9	APA RIV	1,0143	158 154 147 150 150 8
July	ID, WIL	1,0203	175 201 205 183	1.0193	26.3	, WILL		068 063 129 097 152 1.0004
June	OKELAN	1.0181	135 173 199 182	1.0174	23.8	YMOND	1.0070 1.0097	040 050 101 071 112 084 
May	T	1.0193	148 166 177 183	1.0173	23.7	RA	1,0051	051 044 053 098 039 080 1,0059
Apr.		1.0166	160 153 131	1.0157	21.6		1.0045	059 017 026 069 027 088 088 1,0047
Mar.			157 158 153 154	1,0154	21.2		010001	
Feb.		1.0163 1.0146	166 167 157 136		21.7		1	1.0009 1.0079 024 052 030 041 024 035 036 036 027 030 054 020 025 054 072 085 058 047 1.0041 1.0044 1.0035
Jan.		1.0131	126 189 136 150	1.0146 1.0158	20.1		2 8	1.0009 052 024 036 054 054 058
Year		1935	1936 1937 1938 1939	Mean Density	Salinity		1935	1936 1937 1938 1940 1941 1942 Mean Density

																	1/
- - - - - - - - -	# 6 6	18 24 G	1,0173	206	197		161			90,1	1,0106	14.9		\$		13 CO (10)	63 45 63 63 45 63
4 8 8	\$ 4	8 8	1.0251	255	252	259	253	255	255	255	1,0259	34.9		40 40 40 40 40 40		8 8	\$ 8 8
1	1	8	1.0237	239	235	235	233	235	239	234	1,0237	32.0		8 S 8 S 8 B		1	8 8
1.0004	10 mm	1,0236	233	238 235	233	226	216	235	242	220	1,0232	31.4		1,0222		1,0234	55 ag
1,0002	<del>-</del>	1,0243	242	241	238	232	234	242	234	221	1,0236	31.9	SH.	1,0221		1,0235	8
. 88	. WASF	1.0244	246	239 243	235	235	238	240	242	234	1,0239	32,3	AIT, WA	1.0228	VASH.	1,0234	8
BOR, W	STRAIT, WASH.	1.0243	246	249	243	242	247	245	235	239	1.0244	32,9	FUCA STRAIT, WASH.	1.0229	orden), V	1,0234	8 8
S HARI	FUCA	1,0246	244	250 245	245	243	242	244	245	241	1.0245	33.0	DE FUC	1.0226	(Fort Worden), WASH.	1.0232	8 8
I. GRAY	OS6 IAN DE	1.0242	236	247	241	239	235	240	245	24.4	1.0242	32.7		1,0231	TOWNSEND	1,0230	50 CD
	DA49 C	1 0239	215	246	238	238	235	240	243	245	1.0238	32.1	PORT ANGELES, JUAN	1.0230		1,0227	60 6
ABE	1.0024 NEAH	1.0241	232	242 236	228	234	233	233	241	230	1,0235	31.8	RT AN	1,0228	PORT	1,0218	620 GE 620
8 8	1.0013	1,0233	241	228	232	235	228	216	234	83 48 44	1,0233	31.5	<u>a</u>	1.0220		1,0225	E29 625 628
	0.9997	8 °C Ca	1,0236	232	224	235	230	235	239	230	1,0233 1,02	31.5		1,0217		8	40 età eta
	1.0007	(C) (C) (C)	1,0238	229	227	233	233	224	237	236	1,0233	31.5		1.0215		8	1 0229
	1.0001	000 eta eta	1°C	230	235	233	229	227	229	231	1.0232	31.4		1,0200			1,0230
1934	1935	1935	1936	1938	1940	1941	1942	1943	1944	1945	Mean Density	Salinity		1934		1935	1936

Density of Sea Water - Continued

nes Min.		8 8 12 8		7600°		.0068 117 099 110 149 101 111 111 127 127	
Extremes Max. Mi		9 8 8 8 8 8 8		1.0256 1		1.0224 223 223 223 224 220 222 223 220 221 220 221 220 221 220 221 220 221 220 221 220 221 220 221 220 221 220 221 220 221 220 221 221	
Means		D		1,0212		1.0194 200 200 200 197 197 197 198 198 198	
Dec.		1.0156		1,0213		1,0206 2000 1890 1890 218 218 214 203 214 204 1890 1990 215	
Nov.		1.0146		1.0218		1.0211 198 218 2194 215 203 203 203 199 199	8
Oct.		1.0183		1.0221		2012 212 218 212 204 211 220 212 207 207 210 1198 211	2
Sept.	<del>_</del>	0189	SH.	1.0222	WASH.	1,0213 215 215 216 216 216 218 218 210 208 208 208 208 208 208 208 208 208 20	1
Aug.	EVERETT, WASH	169	ON. WASH	.0221 219 218	(Elliott Bay),	2080 219 219 210 210 211 211 211 210 212 210 212 210 202 202	
July	VERET	1.0113	BREMERTON.	216 216 219		1,0199 1 201 201 206 205 205 205 205 205 205 205 205 205 205	
June	L	1.0104	BRE	209	SEATTLE	1,0171 1 180 205 195 195 195 195 196 196 196 196 196 196 196 196 196 196	
May		1.010.1		.0213 1		1.0140 190 190 182 160 173 189 176 171 171 186	2
Apr.		0139		0208 1		0.0468 11848 1781 1781 1831 1831 1831 1831 1831	0
Mar.		.0158 1		0204 1		1.0174 1 185 190 190 195 195 195 195 195 1977 191 186 184 1777 184 184 184	201
Feb.		0131 1		1.0198 1		0186 1 1644 181 199 196 200 200 195 195 182	201
Jan.		1,0153 1		1.0198 1		1.0189 1 198 198 198 198 183 215 214 201 201 194 183	000
Year		1934		1934 1935 1936		1922 1923 1924 1926 1926 1928 1929 1933 1933	3

143 150 132 206 196	167 216 206 215 215 212 1.0068	6°6	\$ 8 8 0 0 5	8 8 8 8		5 B B F F F F F F F F F F F F F F F F F
222 222 241 241 238 238	235 252 252 244 263 1,0263	35.4	\$ 8 8 8	\$ 5 8 8 8 8	8 0 0 8	
198 200 202 221 221	220 224 225 228 228 224 1.0204	27.7	8 8 8 8 8 8	6 0 8 6 8	d 8 8 8 8 9	80 9 00 00 00 01 00
209 192 226 226 2226	222 230 230 226 226 226 223	28.4	1.0104	J. 0175	1,0171	T20
218 200 228 229 229	224 230 232 233 223 1,0214	2000	1.0119	1,0161	1.0199	
217 215 225 227 226		29.5 SH.		1 0192	8 8 8 8 8 0	1,0192
211 211 216 224 223	224 227 227 225 226 228 229 232 231 230 232 231 223 228 230 1.0214 1.0217 1.0218	28.1 29.0 29.4 2: (Duwamish River), WASH	1,0184 1,0197	0194		1,0198
205 206 209 221 220	224 225 229 230 223 1.0214	29.0 nish Riv	1.0180	A, WASH.	A, WAS	1,0190
195 196 205 217 217		28.1 (Duwan	1.0056	TACOMA, WASH.	OLYMPIA, WASH.	1,0184
174 184 186 215 216	202 210 222 224 221 225 220 222 220 226 224 225 223 220 222 1.0190 1.0195 1.0207	9 26.5 SEATTLE		1,0145	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
177 189 177 220 212	202 224 220 220 226 225 223	25.9 S	0 8	1.0153	J D 0 0 0 0	1,0166 1,0169
188 190 175 217 210	217 221 218 226 222 222	25.9	1.0102	1,0172	5 G	1,0135
190 194 190 218	220 220 221 221 227 222	26.7	1.0105 1.0102	1.0187	1.0171	141
202 206 198 220 217	220 221 221 226 226 228 1.0201	27.3	1.0098	1,0172	1.0135	131
194 215 192 221 221	222 221 223 229 229 223	27.4	1.0095	1.0160	1.0174	121
1936 1937 1938 1940	1941 1942 1943 1944 1945 Mean Density	Salinity	1924	1934	1924	1934

Density of Sea Water - Continued

		28 28	1	8	. 0	-			ري ري	95	rs.	9	Q	4	6	1	1	0	1	9	0
Extremes ax. Min.		1.01		8	J. 0	26.1		1	1,0185				130		189	1	1	200	1	1.0176	24.0
Extr Max.		1.0240	1	1 1	1.0240	32.4		i :	1.0232	234	236	231	232	229	234	1 1	1 1 1	247	1	1.0247	33.3
Means		1.0222	1 1	8 8	1.0221	29.9		# = 0 0	1,0222	226	225	223	225	222	224	-	1 1	227	2 2 2	1.0224	30.3
Dec.		1.0226	0 8	219	1,0223	30.2		1.0224	229	231	214	228	224	226	224	1 1	226	224	2 2	1.0225	30.4
Nov.		1.0223	8	222	1.0224	30.3		1.0227	228	229	227	229	226	226	225	1	228	226	1	1.0227	30.7
Oct.		1.0224	1	8		30.3	WASH.	1,0228	228	227	228	229	228	228	226	1 1	1	225	1 1	1.0227	30.7
Sept.	SH.	1,0220	8	2 6		29.8	AN I. W	1.0223	225	222	214	228	226	225	226	1 1	1	228	1 1 1	1.0224	30.3
Aug.	ANACORTES, WASH	1.0223	8 8	A10		29.0	SAN JUAN I		218	220	222	225	220	222	225	1	1 1	227	8 8	1,0223	30.2
July	ACORT	1,0217	1	000		29.3		1,0228		219	219	218	218	220	221	1	1	227	1	1.0221	29.9
June	AN	1,0221	1 2 5	016		29.0	FRIDAY HARBOR,	1.0223	222	223	226	221	225	218	224	1 1	8	228	214	1,0222	30.0
May			226	216		50.3	FRID	8	1,0222	226	227	223	221	218	219	226	1	228	221	1,0223	30.2
Apr.		41 10	224	3 LG	0 02	30.0		8 8	1,0220	229	229	223	228	222	224	226	1 1	228	220	1.0225	30.4
Mar.		1.0222	220	716		29.8		4 8	1,0221	227	230	224	228	220	224	224	1 1	227	223	1,0225	30.4
Feb.			219	000		29.5		3 8	1,0219	232	231	215	226	221	222	222	1	225	220	1.0223	30.2
Jan.			222	917	1.0220	29.8		£ 0	1.0222	228	229	212	226	219	225	222	1 1 2	226	222	1,0223	30.8
Year		1922	1924	1934	-	Salinity		1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	Mean Density	Salinity

						21
	1,0080 117 119 119	128 160 115 101	139 128 132 129 168	101 107 106 112 149	139 152 124 132	1,0080
	1.0233 233 238 239	22 22 22 22 23 25 25 25 25 25 25 25 25 25 25 25 25 25	2554 233 230 230	231 226 225 223 267 231	22 23 23 24 24 24 24 34 34 34	1,0267
	1.0195	197 207 196 200 198	195 197 193 194 216	188 178 196 191 201	202	1,0198
	1,0202	213 222 204 193 165	214 209 192 203 207	122 162 200 173 187	186 202 192 197 216	1.0193
	1.0170 170 191 191	201 206 197 170	187 181 171 186 210	111 170 198 193	174 179 189 198	1.0182
	1.0182 189 177 212	198 182 195 187	188 176 179 191 212	165 175 180 177 198	1 8 8 9 8 6 6 1 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	
SKA	1,0183 183 167 192	209 197 208 198 204	189 173 173 193 221	192 138 201 175 187	202 199 198 198 198	1.0190 1.0187 25.9 25.5
N, ALA	1.0201 185 192 183	192 191 185 177	183 177 162 190 222	212 121 196 170	205 208 201 178 198	
KETCHIKAN, ALASKA	1.0210 :184 177	197 182 178 181	188 180 171 183	190 166 194 179	206 205 217 204 193	1.0190 1.0187
KE	1,0190 185 178 181	194 197 175 199 180	11900 11881 1188	203 204 197 186 211	214 225 225 194	1,0197
	1,0205 1 197 200 200	201 216 189 218	197 203 203 196 216	212 192 207 195 213	212 213 222 222 223	1,0207
	1,0226 206 225 221	204 208 224 224 221	216 216 217 208 215	215 202 202 191 218 208	222 225 225 234 233	1.0216
	1.0229 214 213 229	190 224 208 220 222	209 211 224 205 212	212 193 202 227 216	226 213 221 223 234	1,0216
	1,0227	197 227 208 227 224	197 225 228 189 206	207 202 195 216 216	215 216 218 202 230	1.0213
	1.0222	170 220 202 203 203	177 214 202 202 225	210 199 189 200 207	211 204 187 219	28.0
	1922 1923 1924 1925	1926 1927 1928 1929 1930	1931 1932 1933 1934 1935	1936 1937 1938 1939 1940	1941 1942 1944 1944	Mean Density

Density of Sea Water - Continued

-										
Extremes ax. Min.		1.0082	102	1.0082	11.8		1,0012 032 005	040 012 032 029	1.0006	1.7
Extra Max.		1.0233	234	1.0235	31.8		1.0246 237 233	222 230 230 228 228	1.0246	33.2
Means		1.0180	200	1,0192	26.1		1,0159	144	1,0157	21.6
Dec.		1,0192	200	1.0200	27.2		1.0206	220 218 181 225	1,0205	27.8
Nov.		1,0195	211 206 221	1.0202	27.4		1.0132 192 182 185	187 199 154 158 202	1.0127 1.0177	24.2
Oct.		1.0177	189 193 185	1.0183	25.0		1.0097 130 133 144	167 132 122 108 109	1.0127	17.6
Sept.	A	1.0157	166	1.0170 1.0183	23.3	KA	1.0132 116 120 093	115	1.0112	15.7
Aug.	SITKA, ALASKA	1.0151	172	1.0172	23.5	JUNEAU, ALASKA	1.0112 098 104 079 105	098 072 095 091	1.0104 1.0088 1.0095 1.0112	13.5
July	SITKA.	1.0136	174	1.0164	22.5	UNEAU	1,0099 097 099 085 088	090 058 081 096	1.0088	12.6
June		1.0164	177	1.0170	23.3		1.0105 094 124 110 129	101 090 082 101	1.0104	14.6
May		1.0159	190	1,0181	24.7		1.0134 120 150 176 150	141 135 128 140	1.0142	19.6
Apr.		1.0211	216	1,0213	28.9		1.0214 206 214 214	208 161 168 219	1.0200	27.2
Mar.		1.0213	220	1,0215	29.1		1.0218 211 224 224	214 208 218	1.0217	29.4
Feb.		1.0228	221	1.0223	30.2		1.0218 213 214 219	211 210 205 205 217	1.0213 1.0217	28.0
Jan.		1.0211	218	1.0216	29.3		1.0207 212 218 216 216	192 212 199 204	1.0207	28.1
Year		1924	1943	Mean Density	Salinity		1936 1937 1938 1939 1940	1941 1942 1943 1944 1945	Mean Density	Salinity

															23
	0.9995		1.0001 0.9998 1.0005	000	9 8	0.9998	1.0000	0.9999	100	9666 0	8 8	1.0002	9666 0	0.0	
	1.0244			294	254	249	264	233	265	249	8	231	1,0294	39.4	
	1.0146		1.0142	8 6	180	184	170	158	100	167	1	152	1.0158	21.7	
	1,0205		1.0209	210	220	187	217	193	182	210	200	207	1.0198	26.9	
	1.0214		1.0141 209 198 158	214	218	205	206	156	190	186	198	210	1.0185	25.2	
	1.0102		1.0162	204	146	207	166	129	137	184	156	128	1,0164	22.5	
Ϋ́Α	1,0071	Ą		133	158	158	138	145	100	162	1 1	127	0129	17.9	
r, ALAS	1,0036	ALASK		051	160	081	127	690	060	059		042	1,00076	11.0	
SKAGWAY, ALASKA	1,0027	SEWARD, ALASKA		064	095	083	052	092	090	052	1 0	990	1.0064	9.4	
SK	1,0046	S		109	139	133	260	084	085	078	8	190	•0094	13,3	
	1,0127		.0128 205 153 175		196	182	179	173	175	177	8	149	1,0168	23.0	
	1.0228 ]		.0176 220 209 209	216	212	230	216	210	055	229	2	212	0201	27.3	
	.0230		1,0180 1 225 218 218 253		222	235	223	223	020	233	8	215	0206 1	28.0	
	1.0232 1		1,0200 1 215 227	1 10	236	223	205	214	043	222	1	204	1,0203 1	27.6	
	1.0230 1		1,0181 1 216	250	228	228	215	208	037	215	8	197	.0204	27.7	
	1944		1926 1927 1928 1929	1930	1932	1933	1935	1936	1938	1939	1944	1945	Mean Density 1	Salinity	

Density of Sea Water - Continued

mes Min.		8 8	1.0105	1,0105	14.8		1 1		1.0066		1 1
Extremes Max. Mir		1	1.0265	1.0205 1.0265	35.6		t t t t t t		1.0258		1 1
Means		1	1,0208	1.0205	27.8		1 1		1 1 1		
Dec.		1,0226	225 228 201 201 225	1.0221	29.9		1.0231		1,0218 185 188		1.0243
Nov.		1.0221	218 208 208 222	1.0217	29.4		1.0231		1.0180	ASKA	1.0243
Oct.		1.0204 1.0221 1.0226	203 200 187 200	1.0199 1.0217 1.0221	27.1		1.0228	ASKA	1.0183	ND, AL	1.0243
Sept.	KA V	£	1.0204 188 184 182	1,0190	25.9	V	1.0226	AND, AL	1.0214	(A ISLA	1.0243
Aug.	YAKUTAT, ALASKA	1 1 1	1,0172	1.0171	23.4	KODIAK, ALASKA	1,0238 1,0226	SWEEPER COVE, ADAK ISLAND, ALASKA	1.0227	CONSTANTINE HARBOR, AMCHITKA ISLAND, ALASKA	1,0243
July	AKUTAI	2 8	1.0155 192 164 190	1.0175	ಕ್ಕ ಕಾ	ODIAK.	1.0232	OVE, AD	1.0228	RBOR, A	1.0248 1.0247
June	<b>*</b>	\$ 2 8	1.0189 201 179 201	1,0207 1,0192	26.1	×	1.0228	PER CC	1.0237	NE HAF	1.0248
May		1 1 1	1.0205		28.1		1.0225	SWEE	1.0223	STANTII	2 t 1 1 8 I
Apr.		1	1.0216 218 217 213 224	1.0218	29.5		1,0241		1,0203	CONS	1 1 1 1 1 2
Mar.		1 1	1,0219	1.0218	29.5		1.0237		1.0210		1 1
Feb.		1 1	1,0226 216 227 227 216	1.0222	30.0		1.0232		1.0225		1 1 5 1 0 t
Jan.		C20 G84 G80	1,0228 220 221 212 212	1.0221	29.9		1.0227		1.0238		1.0245
Year		1940	1941 1942 1943 1944 1945	Mean Density	Salinity		1935		1943 1944 1945		1944

1.0259 1.0270 1.0226	1.0274 1.0246	1	* * * * * * * * * * * * * * * * * * * *	1,0277 1,0240 291 249
100	1.00		9	0,
1.0259	2 t 2 t 1 t	-	1 1 3	1.0262
HONOLULU, T.H.  1.0249 1.0248 1.0249 1.0249 1.0256 1.0257 1.0255 1.0256 1.0254 1.0255 258 1.0260 258 262 261 260 260 261 259 256	SAND ISLAND, MIDWAY ISLANDS 1.0265 1.0262 1.0261 1.0262 1.0263 1.0260 1.0256 1.0257 1.0256 1.0256 1.0258 256 259 265 1.0265 272	PUNTA ARENAS, MAGELLAN STRAIT; CHILE 1,0230 1,0226 1,0222 1,0225 1,0224 1,0227 1,0229 1,0230	PUERTO MONTT, CHILE 1.0238 1.0225 1.0228 1.0235 1.0232 1.029 1.0199	VALPARAISO, CHILE 1.0265 1.0261 1.0262 1.0265 1.0263 1.0259 1.0259 1.0263 1.0264 267 261 258 261 259 259 258 260 263 266
		44	14	
1944	1944	1944	1944	1944

Density of Sea Water - Continued

Extremes Max. Min.	1.0	276	1.0275 1.0214 269 227		1,0279 1,0249 275 256
Means	1	8 8	252 1.0252		
Dec.	8 0	204 I.O264	1,0254		1.0269
Nov.	1.0262	402	1,0251		1.0266
Oct.	1.0264	600	1.0250 1		1.0266
Sept.	الالالالالالالالالالالالالالالالالالال	*02	1.0248	_	1.0268
Aug.	1.0263	CALLAO, PERU	1,0247 1,0248 1,0250 1,0251 1,0254 254 256 250 255 252	TALARA, PERU	1.0264
July	0262 1.0262 1.0260 1.0264 1.0263 1.0264 1.0262	CALLA		TALAR	1.0268 1.0267 1.0261 1.0264 1.0268 1.0266 1.0266 1.0269 0.0270 272 271 273 267
June	1.0260	200	1.0244		1.0267
May	1.0262	9	1.0242		1,0268
Apr.	1.0262		1.0235		1.0270
Feb. Mar.	1.0262 1.		1.0234		1.0264
	66 65 EF		1.0239 1.0234 1.0235 1.0242 1.0244 253 248 245 252 245 1.0248		1.0259
Jan.	44.	3 3 3 3 8 4	1.0257		1944 1945 1.0260 1.0264 1.0270
Year	c	) 	1944		1944

Salinity of Sea Water

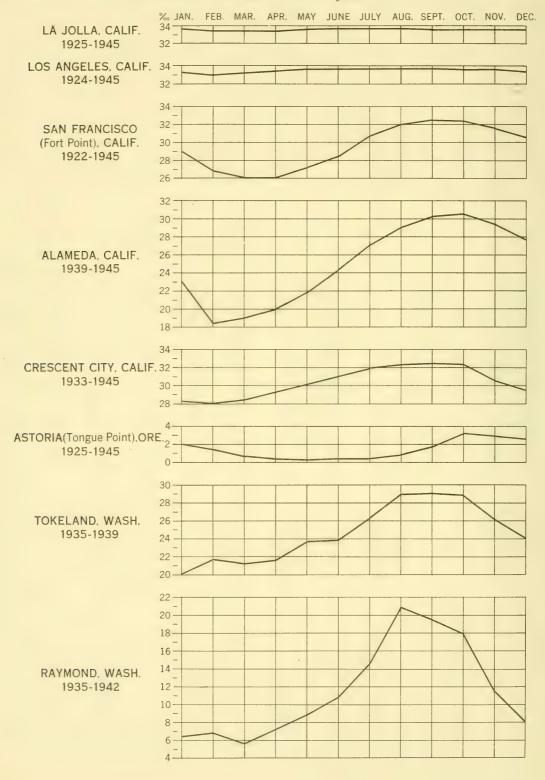
Average monthly surface salinities, in parts per thousand, furnished by the Scripps Institution, La Jolla, Calif.

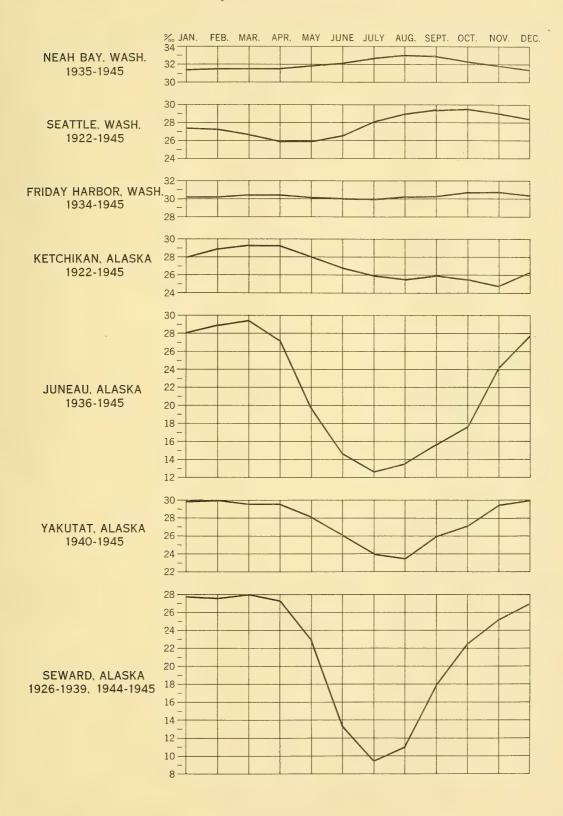
Means		33.60		33,54		55,49		33,43		33°39
Dec.		53.57		33.51		33,38		33,40		33,19
Nov.		33,61		53.59		33,44		33°49		. 53 . 23 . 28
Oct.		33.61		33.58		33,53		33°62		53.54
Sept.		33.62		33,56		53,62	ш.	33.66		33.64
Aug.	<u>L.</u>	33,68	뜨.	33°58	뜨	33,70	D, CALI	33,76	SHIP	53,77
July	BALBOA PIER, CALIF.	33,72	HUENEME PIER, CALIF.	33.64	PACIFIC GROVE, CALIF.	35°73	NORTH FARALLON ISLAND, CALIF.	33.76	LIGHTSHIP	33,84
June	OA PIE	33,69	EME PII	33,62	C GRO	53,71	ALLON	33.68	BLUNTS REEF	33.69
May	BALB	33.67	HOEN	33.60	PACIFI	33,61	rh far	33,45	BLUNTS	33,49
Apr.		33,60		33.61		33.37	NOR	33.20		33,11
Mar.		53,49		33.30		33,19		33°02		33.03
Feb.		33,40		33.39		33,19		32,94		32,99
Jan.	·	33°53		53.45		33.35		33,12		33.07
Series		1925-1945		1919-1945		1919-1945		1925-1942		1922-1941

### Salinity of Sea Water

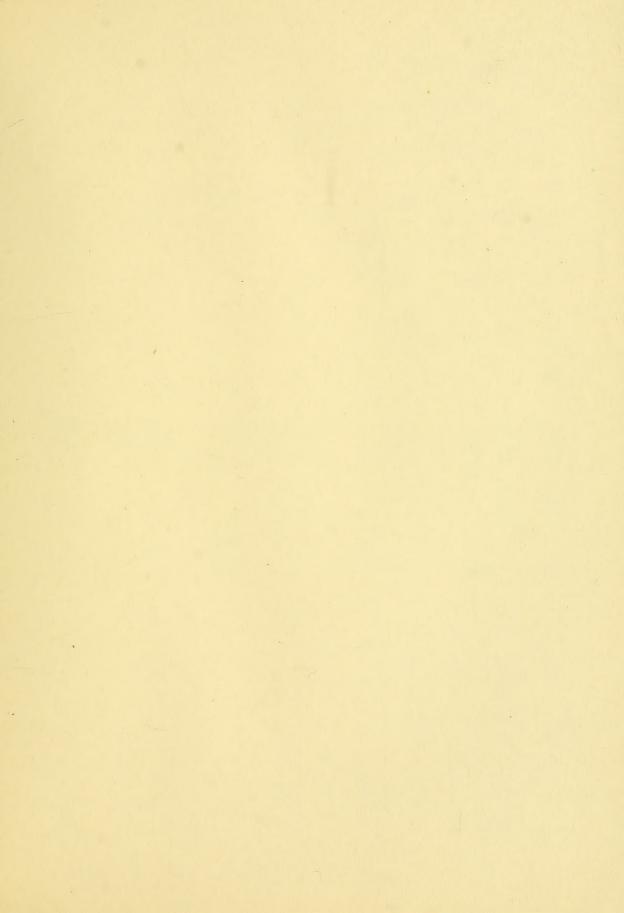
#### Monthly means in parts per thousand

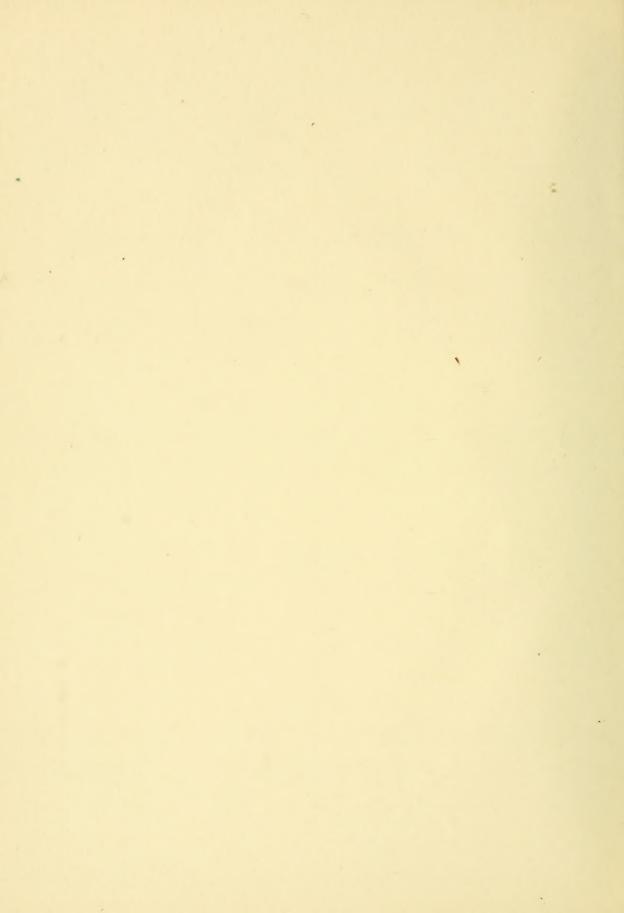
The seasonal variation of salinity is here shown graphically for those Coast and Geodetic Survey stations where observations cover five years or more.











# CORRESPONDING DENSITIES AND SALINITIES

[Density at 15° C.—Salinity in parts per 1,000]

Density	Salinity	Den- sity	Salinity	Den- sity	Salinity	Den- sity	Salinity	Density	Salinity	Density	Salinity
0, 9991	0. 0	1. 0046	7. 1	1. 0101	14. 2	1. 0156	21. 4	1. 0211	28. 6	1. 0266	35. 8
. 9992	. 0	1. 0047	7. 2	1. 0102	14. 4	1. 0157	21. 6	1. 0212	28. 8	1. 0267	35. 9
. 9993	. 1	1. 0048	7. 3	1. 0103	14. 5	1. 0158	21. 7	1. 0213	28. 9	1. 0268	36. 0
. 9994	. 3	1. 0049	7. 5	1. 0104	14. 6	1. 0159	21. 8	1. 0214	29. 0	1. 0269	36. 2
. 9995	. 4	1. 0050	7. 6	1. 0105	14. 8	1. 0160	22. 0	1. 0215	29. 1	1. 0270	36. 3
. 9996 . 9997 . 9998 . 9999 1. 0000	.5 .7 .8 .9	1, 0051 1, 0052 1, 0053 1, 0054 1, 0055	7. 7 7. 9 8. 0 8. 1 8. 2	1. 0106 1. 0107 1. 0108 1. 0109 1. 0110	14. 9 15. 0 15. 2 15. 3 15. 4	1. 0161 1. 0162 1. 0163 1. 0164 1. 0165	22. 1 22. 2 22. 4 22. 5 22. 6	1. 0216 1. 0217 1. 0218 1. 0219 1. 0220	29. 3 29. 4 29. 5 29. 7 29. 8	1. 0271 1. 0272 1. 0773 1. 0274 1. 0275	36. 4 36. 6 36. 7 36. 8 37. 0
1.0001	1. 2	1. 0056	8. 4	1. 0111	15. 6	1. 0166	22. 7	1. 0221	29. 9	1. 0276	37. 1
1.0002	1. 3	1. 0057	8. 5	1. 0112	15. 7	1. 0167	22. 9	1. 0222	30. 0	1. 0277	37. 2
1.0003	1. 4	1. 0058	8. 6	1. 0113	15. 8	1. 0168	23. 0	1. 0223	30. 2	1. 0278	37. 3
1.0004	1. 6	1. 0059	8. 8	1. 0114	16. 0	1. 0169	23. 1	1. 0224	30. 3	1. 0279	37. 5
1.0005	1. 7	1. 0060	8. 9	1. 0115	16. 1	1. 0170	23. 3	1. 0225	30. 4	1. 0280	37. 6
1. 0006	1.8	1. 0061	9. 0	1. 0116	16. 2	1. 0171	23. 4	1. 0226	30. 6	1. 0281	37, 7
1. 0007	2.0	1. 0062	9. 2	1. 0117	16. 3	1. 0172	23. 5	1. 0227	30. 7	1. 0282	37, 9
1. 0008	2.1	1. 0063	9. 3	1. 0118	16. 5	1. 0173	23. 7	1. 0228	30. 8	1. 0283	38, 0
1. 0009	2.2	1. 0064	9. 4	1. 0119	16. 6	1. 0174	23. 8	1. 0229	31. 0	1. 0284	38, 1
1. 0010	2.4	1. 0065	9. 6	1. 0120	16. 7	1. 0175	23. 9	1. 0230	31 1	1. 0285	38, 2
1. 0011	2. 5	1. 0066	9. 7	1. 0121	16. 9	1. 0176	24. 0	1. 0231	31. 2	1. 0286	38. 4
1. 0012	2. 6	1. 0067	9. 8	1. 0122	17. 0	1. 0177	24. 2	1. 0232	31. 4	1. 0287	38. 5
1. 0013	2. 8	1. 0068	9. 9	1. 0123	17. 1	1. 0178	24. 3	1. 0233	31. 5	1. 0288	38. 6
1. 0014	2. 9	1. 0069	10. 1	1. 0124	17. 3	1. 0179	24. 4	1. 0234	31. 6	1. 0289	38. 8
1. 0015	3. 0	1. 0070	10. 2	1. 0125	17. 4	1. 0180	24. 6	1. 0235	31. 8	1. 0290	38. 9
1. 0016	3. 2	1. 0071	10. 3	1. 0126	17. 5	1. 0181	24. 7	1. 0236	31. 9	1. 0291	39. 0
1. 0017	3. 3	1. 0072	10. 5	1. 0127	17. 6	1. 0182	24. 8	1. 0237	32. 0	1. 0292	39. 2
1. 0018	3. 4	1. 0073	10. 6	1. 0128	17. 8	1. 0183	25. 0	1. 0238	32. 1	1. 0293	39. 3
1. 0019	3. 5	1. 0074	10. 7	1. 0129	17. 9	1. 0184	25. 1	1. 0239	32. 3	1. 0294	39. 4
1. 0020	3. 7	1. 0075	10. 8	1. 0130	18. 0	1. 0185	25. 2	1. 0240	32. 4	1. 0295	39. 6
1. 0021	3. 8	1. 0076	11. 0	1. 0131	18. 2	1. 0186	25. 4	1. 0241	32. 5	1. 0296	39. 7
1. 0022	3. 9	1. 0077	11. 1	1. 0132	18. 3	1. 0187	25. 5	1. 0242	32. 7	1. 0297	39. 8
1. 0023	4. 1	1. 0078	11. 2	1. 0133	18. 4	1. 0188	25. 6	1. 0243	32. 8	1. 0298	39. 9
1. 0024	4. 2	1. 0079	11. 4	1. 0134	18. 6	1. 0189	25. 8	1. 0244	32. 9	1. 0299	40. 1
1. 0025	4. 3	1. 0080	11. 5	1. 0135	18. 7	1. 0190	25. 9	1. 0245	33. 0	1. 0300	40. 2
1. 0026	4. 5	1. 0081	11. 6	1. 0136	18. 8	1. 0191	26. 0	1. 0246	33. 2	1. 0301	40. 3
1. 0027	4. 6	1. 0082	11. 8	1. 0137	19. 0	1. 0192	26. 1	1. 0247	33. 3	1. 0302	40. 4
1. 0028	4. 7	1. 0083	11. 9	1. 0138	19. 1	1. 0193	26. 3	1. 0248	33. 4	1. 0303	40. 6
1. 0029	4. 8	1. 0084	12. 0	1. 0139	19. 2	1. 0194	26. 4	1. 0249	33. 6	1. 0304	40. 7
1. 0030	5. 0	1. 0085	12. 2	1. 0140	19. 4	1. 0195	26. 5	1. 0250	33. 7	1. 0305	40. 8
1. 0031	5. 1	1. 0086	12. 3	1. 0141	19. 5	1. 0196	26. 7	1. 0251	33. 8	1. 0306	41. 0
1. 0032	5. 2	1. 0087	12. 4	1. 0142	19. 6	1. 0197	26. 8	1. 0252	34. 0	1. 0307	41. 1
1. 0033	5. 4	1. 0088	12. 6	1. 0143	19. 7	1. 0198	26. 9	1. 0253	34. 1	1. 0308	41. 2
1. 0034	5. 5	1. 0089	12. 7	1. 0144	19. 9	1. 0199	27. 1	1. 0254	34. 2	1. 0309	41. 4
1. 0035	5. 6	1. 0090	12. 8	1. 0145	20. 0	1. 0200	27. 2	1. 0255	34. 4	1. 0310	41. 5
1. 0036	5. 8	1. 0091	12. 9	1. 0146	20. 1	1. 0201	27. 3	1. 0256	34. 5	1. 0311	41. 6
1. 0037	5. 9	1. 0092	13. 1	1. 0147	20. 3	1. 0202	27. 4	1. 0257	34. 6	1. 0312	41. 8
1. 0038	6. 0	1. 0093	13. 2	1. 0148	20. 4	1. 0203	27. 6	1. 0258	34. 7	1. 0313	41. 9
1. 0039	6. 2	1. 0094	13. 3	1. 0149	20. 5	1. 0204	27. 7	1. 0259	34. 9	1. 0314	42. 0
1. 0040	6. 3	1. 0095	13. 5	1. 0150	20. 6	1. 0205	27. 8	1. 0260	35. 0	1. 0315	42. 1
1. 0041	6. 4	1. 0096	13. 6	1. 0151	20. 8	1. 0206	28. 0	1. 0261	35. 1	1. 0316	42. 3
1. 0042	6. 6	1. 0097	13. 7	1. 0152	20. 9	1. 0207	28. 1	1. 0262	35. 3	1. 0317	42. 4
1. 0043	6. 7	1. 0098	13. 9	1. 0153	21. 0	1. 0208	28. 2	1. 0263	35. 4	1. 0318	42. 5
1. 0044	6. 8	1. 0099	14. 0	1. 0154	21. 2	1. 0209	28. 4	1. 0264	35. 5	1. 0319	42. 7
1. 0045	7. 0	1. 0100	14. 1	1. 0155	21. 3	1. 0210	28. 5	1. 0265	35. 6	1. 0320	42. 8

